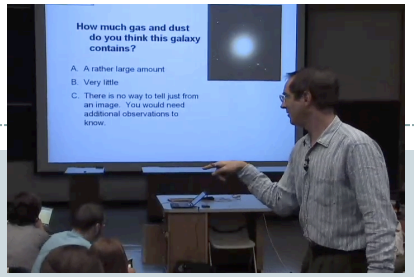
Teaching faculty about effective use of clickers


How much gas and dust do you think this galaxy contains?
A. A rather large amount
B. Very little
C. There is no way to tell just from an image. You would need additional observations to know.

Dr. Stephanie V. Chasteen

Physics Department & Science Ed. Initiative
University of Colorado - Boulder

Web and blog: http://sciencegeekgirl.com
Email: stephanie@sciencegeekgirl.com

THERE IS A POLL OPEN. Do you see it? If not, select "polling" from the dropdown menu on your toolbar.

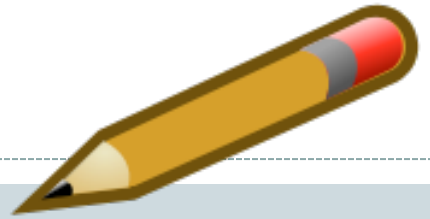
There are **handouts** for this session that may be helpful at http://theactiveclass.com (see most recent post about this webinar)

Technical Difficulties?

Contact
1-866-229-3239

Sponsored by i>clicker
www.theactiveclass.com

Agenda



1. The **goals** of our faculty PD
2. What *is* **peer instruction?**
3. How do we make an **effective PD** experience so instructors are more likely to use peer instruction and use it successfully?

Introducing Me

Science Education Initiative

http://colorado.edu/SEI

Applying scientific principles to improve science education – What are students learning, and which instructional approaches improve learning?

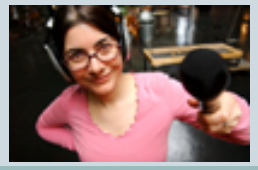
Physics Education Research Group

http://PER.colorado.edu

One of largest PER groups in nation, studying technology, attitudes, classroom practice, & institutional change.

Blogger & Consultant

http://sciencegeekgirl.com



And thanks to our sponsors today…

The Active Class

The Active Class is a multi-author blog that provides a forum for educators to exchange ideas about teaching and learning with technology. Visit us at www.theactiveclass.com.

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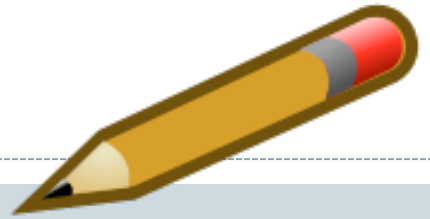
Agenda



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The typical pattern…

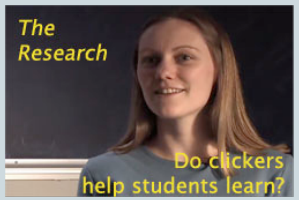
- (we) Tell
- (they) Try
- (they) Fail *or* fade
- (we) Repeat

What goes wrong?

U. Colorado clicker resources…

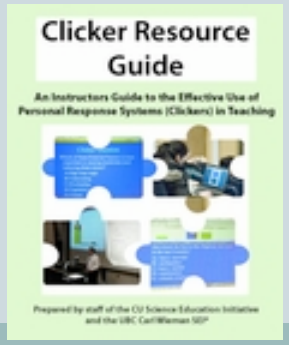
Videos of effective use of clickers http://STEMvideos.colorado.edu

2-5 mins long



Clicker resource page http://STEMclickers.colorado.edu

- Instructor's Guide
- Question banks
- Workshops
- Literature / Articles



Goals of our faculty PD

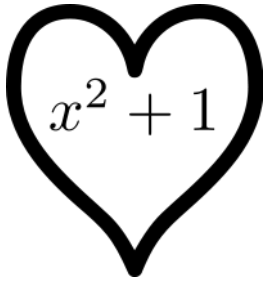
We want to help faculty to….

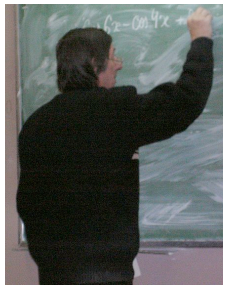
- Recognize the benefit of using clickers and peer instruction to promote student engagement
- Begin to put together a pedagogical strategy for using clickers, including thoughtful question-writing
- Be prepared for some common challenges and strategies to overcome them

Technical training is separate from pedagogical training

Effective PD is….

- Collaborative
- Active and hands-on
- Discipline-oriented
- Instructor-driven
- Respectful
- Research-based
- Sustained over time





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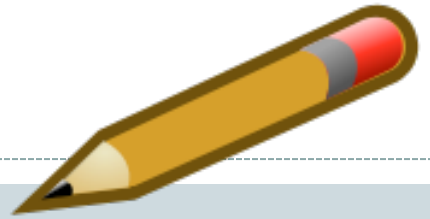

1. The **goals** of our faculty PD
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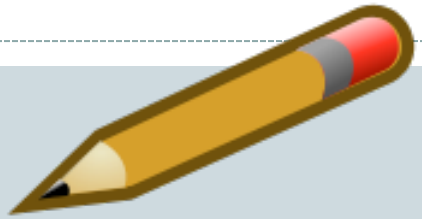
What *is* Peer Instruction?

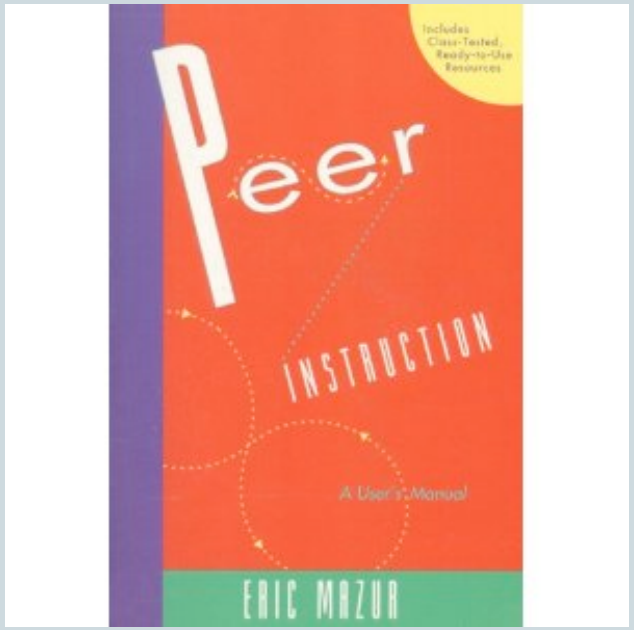


POLL:

Do you know what peer instruction is (in the context of clickers)?

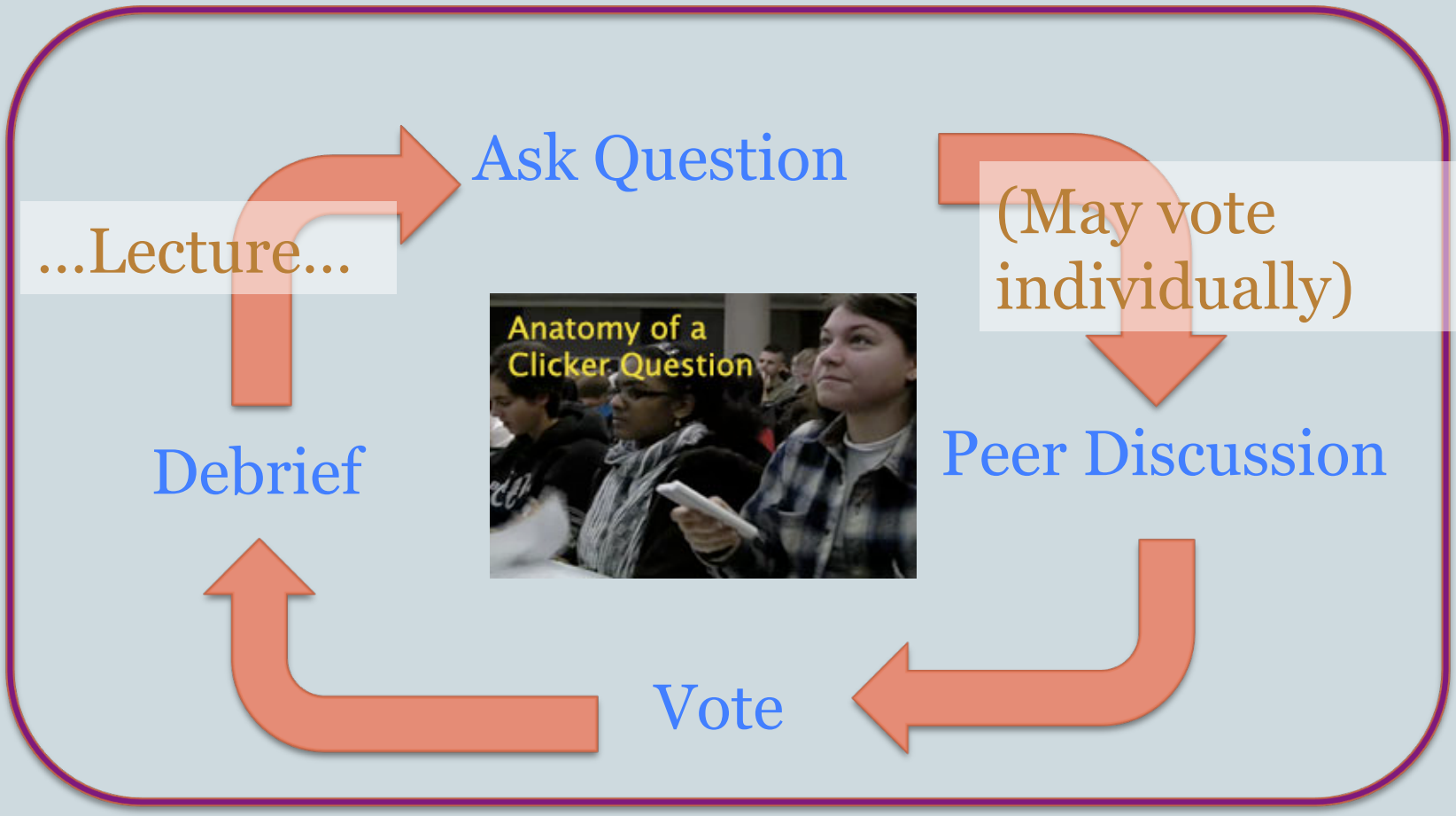
A. Yes
B. No
C. Maybe, not sure

i.e., does this look familiar?



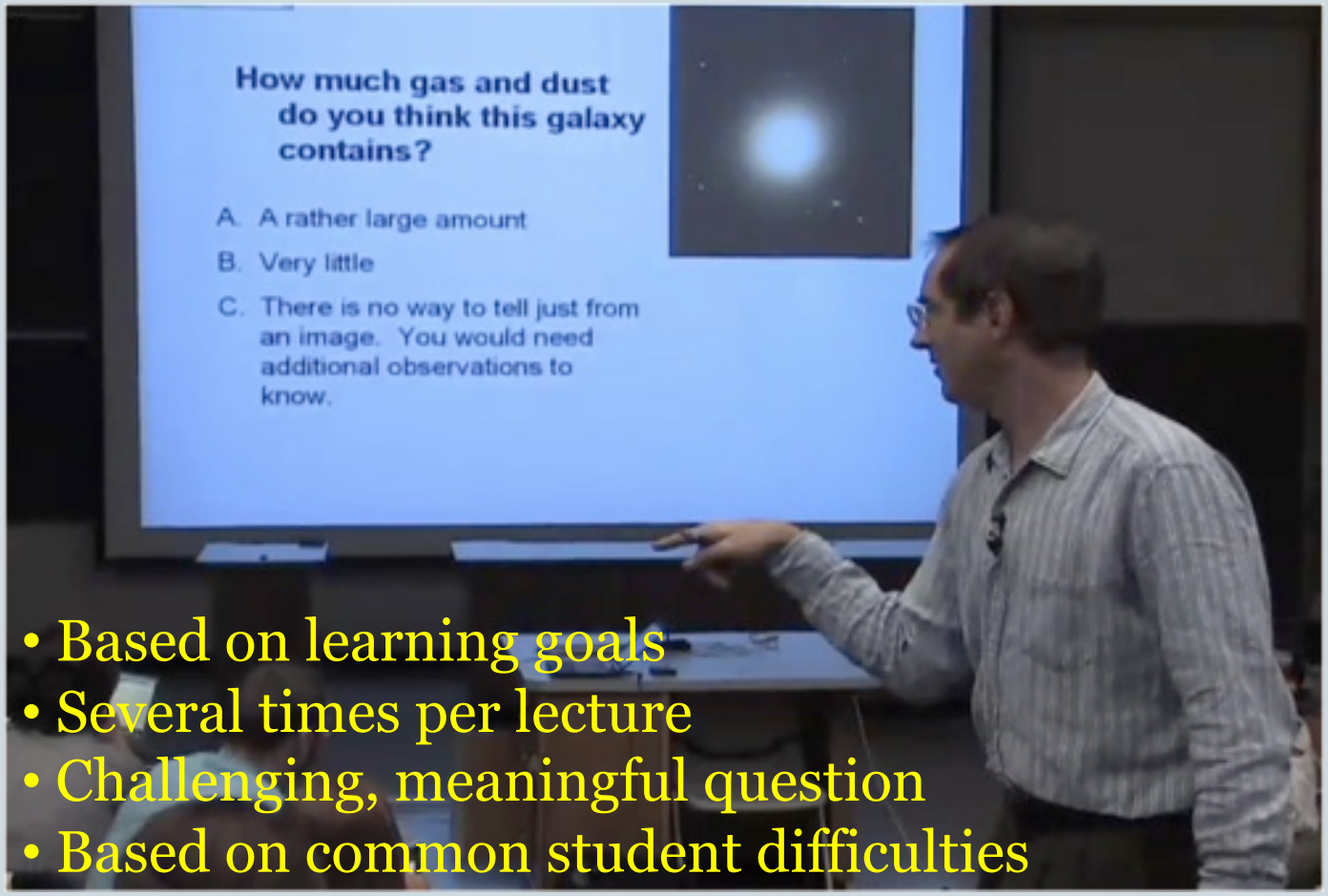
Mazur(1996), *Peer Instruction*

Anatomy of a clicker question



*** See also: Peer Instruction, A User's Manual. E. Mazu**

1. Ask Question


How much gas and dust do you think this galaxy contains?
A. A rather large amount
B. Very little
C. There is no way to tell just from an image. You would need additional observations to know.

- Based on learning goals
- Several times per lecture
- Challenging, meaningful question
- Based on common student difficulties

Example question: Biology

A small acorn over time can grow into a huge oak tree. The tree can weigh many tons. Where does most of the mass come from as the tree grows?

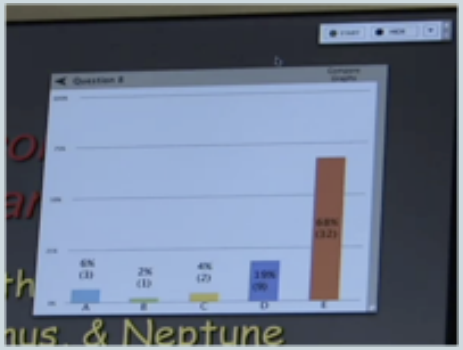
A) Minerals in the soil
B) Organic matter in the soil
C) Gases in the air
D) Sunlight

Common misconception leads to answers (A) and (B). Correct answer: C

2. Peer Discussion

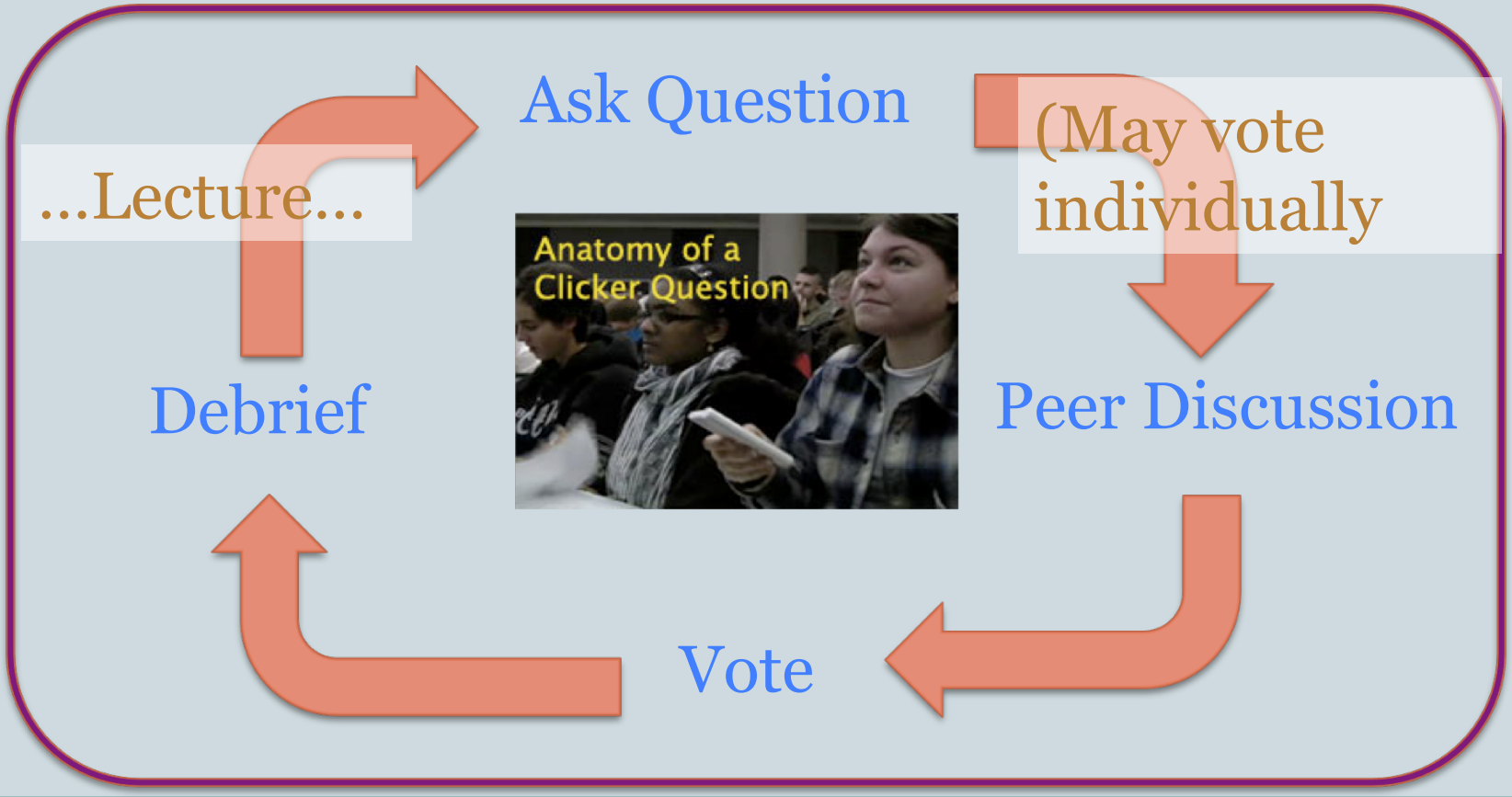
- Students learn more deeply by teaching each other
- Makes them articulate answer
- Lets you see inside their heads
- Typically allow 2-5 mins

3. Wrap-Up Discussion



- Consider whether to show the histogram immediately
- Ask multiple students to defend their answers, respectfully
- Why are wrong answers wrong and why right answer is right

Question break

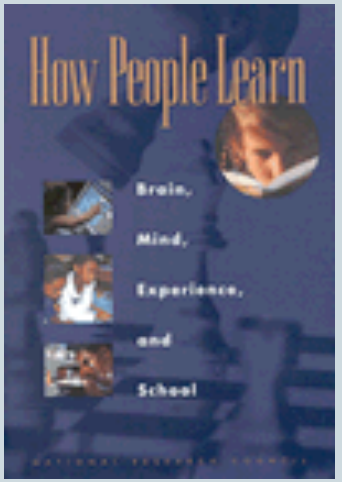


“Clickers” are really just a focal point

We aim to help instructors:

- Use student-centered, interactive teaching techniques
- By the use of a tool (clickers) which makes a transition to that pedagogy easier

Our talks are “how people learn” talks in disguise. ☺

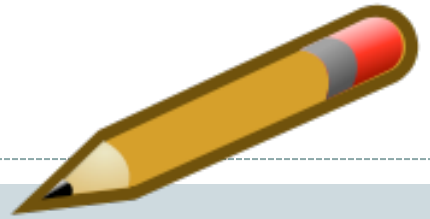


Bransford, Brown, Cocking (1999), *How People Learn*

How we try to accomplish goals:

- Give a clear **introduction** to peer instruction. *What does it really look like?*
- Give **experience** in peer instruction. *How does it feel as a student? As an instructor?*
- **Why** does it work? *The research.*
- **Respect** their experience. *Answer their questions/challenges, rather than being gung-ho salesman.*
- Provide opportunity **for practice and feedback.** *Especially in writing questions and facilitation.*
- **Practice what we preach.** *Do all this in a student-centered, interactive environment. Don't lecture about how not to lecture.*

Agenda



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BP

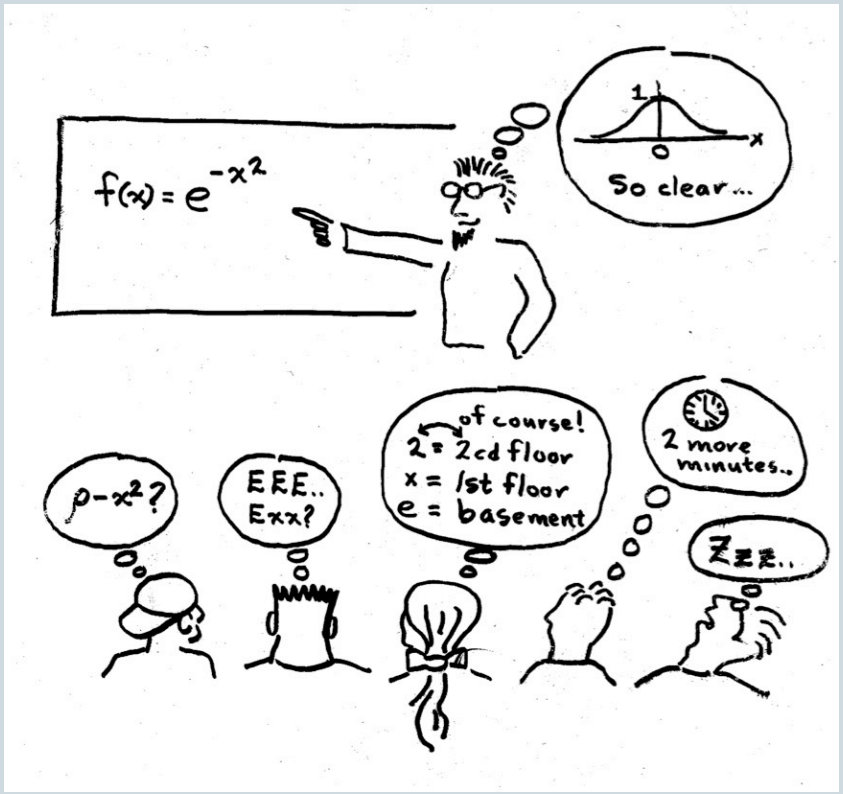
This symbol indicates conscious attempt to use Best Practices in PD
(Collaborative, Active, Respectful, Hands-on, Teacher-driven, Research-based)

A Sample Outline (3 hrs)

1. Brief introduction to clickers (30 min)
   - *Poll questions*
   - *Why question?*
   - *Question cycle and goals*
   - *Video*
   - *Technology*
2. About Peer Instruction (1 ½ hour)
   - *Practice question*
   - *Chance for questions*
   - *(Research)*
   - *Challenges*
   - *Best practices*
3. Question writing (1 hour)
   - *Talk about best practices*
   - *Look at example questions*
   - *Practice writing & revising*

Introduction

- Some quick poll questions
- Workshop framing: Why question? (worksheet)

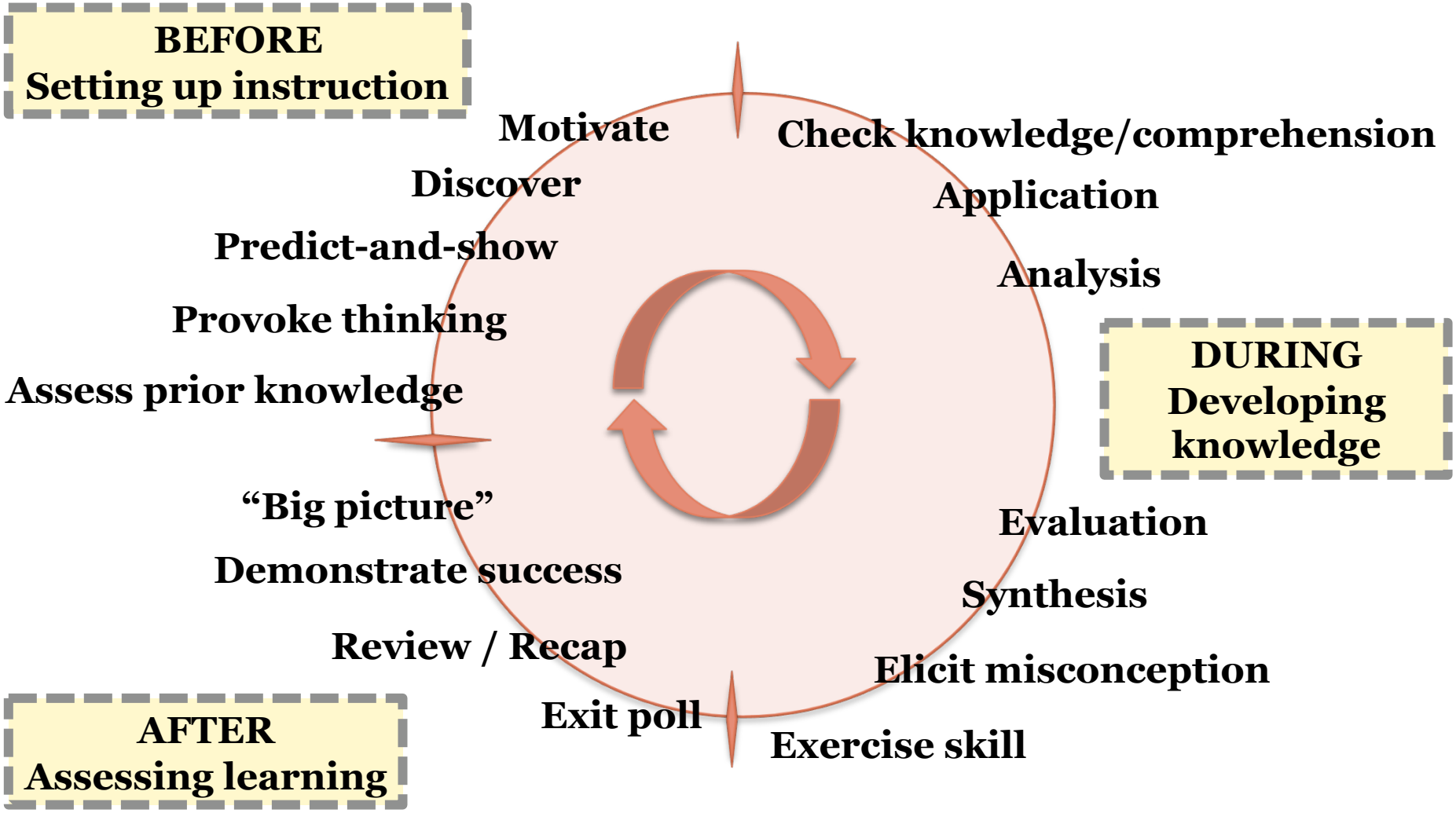


The toughest thing about asking questions in class is…

A. Writing good questions
B. Getting students to really think about them
C. Getting students to answer the questions / Nobody responds
D. The same students always respond / Not everybody responds
E. It takes too long / I have a lot of content to cover

This is an example question about questions. Have others? Share in the chat!

WHEN to ask? Questioning Cycle



Credit: Rosie Piller and Ian Beatty.

OR… What is the goal of your question?

Setting up instruction:
- Assess prior knowledge
- Provoke thinking about something new
- Stimulate discussion
- Predict-and-show
- Induce cognitive conflict

Develop Knowledge
- Elicit misconception
- Exercise skill
- Conceptual understanding

Assess Learning:
- Exit poll
- Probe limits of understanding
- Demonstrate success
- Review

Which is the goal of most of your in-class verbal questions?

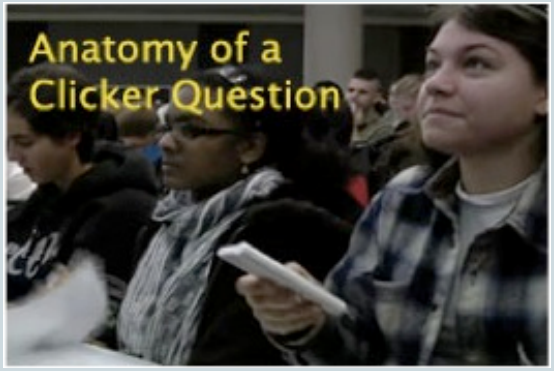
A. Setting up instruction
B. Developing knowledge
C. Assess Learning
D. Something else

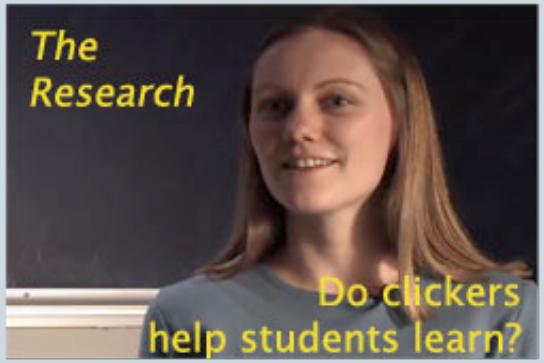
Then show a video

http://STEMvideos.colorado.edu 2-5 mins long

← The hard sell

Brief snapshot →





Detailed look at Implementation →

← Helpful resource

We want to show them what it really looks like

BP

Why clickers?

Discussion: What aspects of clicker technology makes it helpful for student learning?

I make sure that we mention:
- Anonymity
- Accountability
- Instant feedback (histogram)
- How the system actually works
- *But not tech training…*

Again, we're trying to give a pedagogical framework

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The Practice Question

- How do you choose an authentic question that your audience can all understand, and thus see the value of discussion?

BP

Got any other good practice questions? Share them in the chat!

One possible question (my fave)

If you could have any of the following superpowers, which would it be? The ability to…

A. Change the magnetization of things
B. Change the electric charge of things
C. Change the mass of things

No one right answer encourages discussion.

Courtesy Ian Beatty, UNC

Another question

Your sister in law calls to say that she's having twins. Which of the following is the most likely? (Assume she's having fraternal, not identical, twins)

A) Twin boys
B) Twin girls
C) One girl and one boy
D) All are equally likely

Courtesy Derek Bruff, Vanderbilt

Another possible question

A tennis racket and can of balls together costs $110. The tennis racket alone costs $100 more than the can of balls. How much does the can of balls alone cost?

A. $5
B. $10
C. $11
D. $100
E. None of these

Most people at first glance say that the balls cost $10. Silent vote: 35% right. After discussion: 75%. (Right answer is A).

Courtesy Steven Pollock, CU-Boulder

Discuss Peer Instruction Challenges

Chat discussion: What do you think are the main PI sticking points for faculty?

3 approaches....

1. Small Groups

What are the challenges they foresee? What are some solutions? Share out.

2. Pre-seeded sheets

Have common challenges written down on sheets of paper, give one to each group. Each group discusses, brainstorms, and share-out

3. Discuss within each section of PI best-practices

BP

•Writing questions / Peer discussion / Wrap-up discussion

What *are* the challenges?

POLL: Which do you think is the most common challenge cited by teachers?

A. Writing good questions
B. Technical issues
C. Tough to get students to discuss questions
D. I have too much content to cover / takes too much time
E. Something else

(The Research)

- Show some basic messages of "How People Learn"
- Data the interactive engagement works (e.g., Hake study)
- Data that peer instruction works (Mazur + Smith studies)

BP

See powerpoints from my workshops at http://STEMclickers.colorado.edu, and past webinars at http://theactiveclass.com for examples.

Best Practices in Facilitation

1. Question-writing
2. Peer discussion phase
3. Whole-group wrap-up discussion

This is a nice follow-up to the "challenges" discussion; addressing their questions, rather than preaching. Tough part of the workshop.

3 approaches....

1. Small Groups

Brainstorm in groups, aided by worksheet

2. Didactic

Just tell them

But does discussion of best practices *lead* to best practices???

Role-play

Then, give small groups a question to try teaching. (Seed a "ringer" group that will do a poor job!)

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   - *Example questions*
   - *Practice writing & revising*

Best practices in question-writing

2 approaches....

1. Three facets

Mechanics / Depth / Goals. Bloom's Taxonomy. Show examples to illustrate.

2. Handouts

Give handouts / discuss. Which will be most challenging for you?

Example questions are hard to find that work for a multi-disciplinary audience. Note that humanities questions tend to be a bit different from sciences.

Example questions

I've found that looking through example questions is valuable in getting ideas and putting ideas into context. Be sensitive to discipline! Use a variety of types of questions. I have example questions you can use.

3 approaches....

1. Gallery walk

Post questions around room. Visit. Discuss.

2. Question rating sheet

Sheet of questions – with partner, rate them as good, bad, or ugly.

3. Find the theme

Give each group 3 questions and ask to find the theme. Share.

4. Powerpoint

Show a bunch of examples in PPT slides and discuss as group

Writing their own question

- Draft question “on something you’ll teach next week”
- Or, give a learning goal
- Then ask them to shop for ideas to improve it during the discussion
- Work with a neighbor to revise the question.

BP

If time… they can then use this question in a role-play

What do you think?

CHAT DISCUSSION

What additional ideas, questions, or concerns do you have about teaching effective question writing techniques?

Do you think this will work with your faculty?

To Learn More… (this webinar can't do it all!)

Watch expert users

Read books

Bruff *Teaching with Classroom Response Systems*
Mazur *Peer Instruction*
Duncan *Clickers in the Classroom*
Asirvatham *Clickers in Chemistry*

Watch our videos; get resources

Contact me

http://sciencegeekgirl.com
stephanie@sciencegeekgirl.com
CU web: http://per.colorado.edu

Look for the session recording & future webinars at **iclicker.com** (user community) or our twitter stream **@iclicker**

Next: **Connecting with Participatory: Clickers and Deep Learning**
Derek Bruff / November 3rd, 1pm EST.